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UNITED STATES PATENT APPLICATION FOR

TIME ZONE MANAGEMENT

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8 **TIME ZONE MANAGEMENT**

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11 **FIELD OF THE INVENTION**

12 This invention relates generally to the field of computer programs  
13 implementing date-book like applications. More particularly, this invention relates  
14 to a time zone management method and apparatus particularly suitable for a  
15 palmtop computer.  
16

17 **BACKGROUND OF THE INVENTION**

18 As the components required to build a computer system have reduced in  
19 size, new categories of computer systems have emerged. One of the new  
20 categories of computer systems is the "palmtop" computer system. A palmtop  
21 computer system is a computer that is small enough to be held in the hand of a  
22 user and can be "palm-sized." Most palmtop computer systems are used to  
23 implement various Personal Information Management (PIM) applications such as  
24 an address book, a daily organizer (i.e., a date-book like application) and electronic  
25 notepads, to name a few.

26 Among the most popular features of such palmtop computers is the daily  
27 organizer which operates on the palmtop computer and synchronizes to a similar  
28 application on a user's desktop computer. Such applications of the palmtop  
29 computer have made managing appointments and events easier and more

1 convenient for many users. However, rapid advances in communication and travel  
2 have caused many people to commonly have dealings with associates all over the  
3 world. This makes management of an event calender more challenging due to the  
4 need to operate across multiple time zones. Heretofore, the date-book functions  
5 of computer applications in general including palmtop computers has been  
6 inadequate to deal with the problems associated with maintaining a calendar of  
7 events occurring in multiple time zones.

8 Consider for example the following situations:

- 9 1. You are in France and schedule an appointment for a phone call with  
10 someone in California. You both want to deal with the same time and time zone  
11 to create the appointment, but still see at what time this will translate in your own  
12 local time zone.
- 13 2. You are in France and schedule an appointment for a phone call with  
14 someone in California while you will be in Tokyo (or maybe you don't even know  
15 where you will be at the appointment time). You want to use the California time to  
16 set the appointment, and see it displayed in your local time, even if you have  
17 changed time zone since you set it.
- 18 3. You are in France, and schedule a meeting with someone in California, but  
19 this meeting will take place in Tokyo. You both want to be able to use Tokyo time.  
20  
21

## 22 SUMMARY OF THE INVENTION

23 The present invention relates generally to methods and apparatus for time  
24 zone management, particularly with palmtop computers. Objects, advantages and  
25 features of the invention will become apparent to those skilled in the art upon  
26 consideration of the following detailed description of the invention.

27 In one embodiment of the present invention, a time zone management  
28 system and method for a date-book like application lets a user associate a time  
29 zone with an event or appointment, especially on a palmtop computer. The event  
30 can be associated with the time zone by selecting the time zone as an attribute  
from a details menu, or other suitable user interface mechanism or other

1 mechanism. The user can select a display time zone, and all events to be  
2 displayed are translated to the display time zone to be displayed on the palmtop  
3 computer. This provides many advantages including simplifying the use of the  
4 palmtop computer across time zones so that events can be entered directly in a  
5 particular remote time zone, but displayed in another time zone of the user's  
6 choosing.

7 In one embodiment consistent with the present invention, a method of  
8 management of time zone information in a calendar application, includes storing  
9 an event associated with a block of time; storing a time zone attribute associated  
10 with the event; establishing a display time zone for display of events; translating the  
11 block of time associated with the event from the stored time zone to the display  
12 time zone; and displaying the event as occurring at the translated block of time.

13 A palmtop computer having time zone information management, consistent  
14 with certain embodiments of the present invention has a programmed processor  
15 and a display. A calendar application runs on the programmed processor to store  
16 an event associated with a block of time, the calendar application further operating  
17 to: store an event time zone attribute associated with the event; store a display time  
18 zone for display of events; translate the block of time associated with the event  
19 from the stored time zone to the display time zone; and means for displaying the  
20 event as occurring at the translated block of time on the display.

21 A palmtop computer having time zone information management, consistent  
22 with an embodiment of the present invention has a programmed processor, a  
23 display and a user interface. A calendar application runs on the programmed  
24 processor to store an event associated with a block of time, the calendar  
25 application further operating to: store an event time zone attribute associated with  
26 the event; store a display time zone for display of events; translate the block of time  
27 associated with the event from the stored time zone to the display time zone;  
28 displaying the event as occurring at the translated block of time in a daily time grid  
29 on the display; wherein the display time zone is established by a user selection  
30 from a display time zone user interface element forming part of the user interface;

1 wherein the event time zone is established by a user selection from an event time  
2 zone user interface element forming part of the user interface.

3 The above summaries are intended to illustrate exemplary embodiments of  
4 the invention, which will be best understood in conjunction with the detailed  
5 description to follow, and are not intended to limit the scope of the appended  
6 claims.

### 7 8 **BRIEF DESCRIPTION OF THE DRAWINGS**

9 The features of the invention believed to be novel are set forth with  
10 particularity in the appended claims. The invention itself however, both as to  
11 organization and method of operation, together with objects and advantages  
12 thereof, may be best understood by reference to the following detailed description  
13 of the invention, which describes certain exemplary embodiments of the invention,  
14 taken in conjunction with the accompanying drawings in which:

15 **FIGURE 1** is an exemplary display of a daily view of a date-book like event  
16 manager.

17 **FIGURE 2** is an exemplary display illustrating an extension of the event  
18 manager that permits association of a time zone with an event consistent with an  
19 embodiment of the present invention.

20 **FIGURE 3** is an exemplary display illustrating selection of a time zone for an  
21 event consistent with an embodiment of the present invention.

22 **FIGURE 4** is an exemplary display showing an event that is translated to a  
23 default time zone consistent with an embodiment of the present invention.

24 **FIGURE 5** is an exemplary display showing selection of a display time zone  
25 in an embodiment consistent with the present invention.

26 **FIGURE 6** is an exemplary display showing an event in a selected display  
27 time zone in an embodiment consistent with the present invention.

28 **FIGURE 7** is an exemplary display showing a time zone change alert  
29 consistent with an embodiment of the present invention.

1           **FIGURE 8** is a block diagram of a computer system suitable for hosting an  
2 application consistent with embodiments of the present invention.

3           **FIGURE 9** is a flow chart depicting association of a time zone with an event  
4 consistent with certain embodiments of the present invention.

5           **FIGURE 10** is a flow chart depicting selection of a display time zone  
6 consistent with certain embodiments of the present invention.

7           **FIGURE 11** is a flow chart depicting semiautomatic time zone changes  
8 consistent with certain embodiments of the present invention.

## 9 10                           **DETAILED DESCRIPTION OF THE INVENTION**

11           In the following detailed description of the present invention, numerous  
12 specific details are set forth in order to provide a thorough understanding of the  
13 present invention. However, it will be recognized by one skilled in the art that the  
14 present invention may be practiced without these specific details or with  
15 equivalents thereof. In other instances, well known methods, procedures,  
16 components, and circuits have not been described in detail as not to unnecessarily  
17 obscure aspects of the present invention.

## 18 19                           **NOTATION AND NOMENCLATURE**

20           Some portions of the detailed descriptions which follow are presented in  
21 terms of procedures, steps, logic blocks, processing, and other symbolic  
22 representations of operations on data bits that can be performed on computer  
23 memory. These descriptions and representations are the means used by those  
24 skilled in the data processing arts to most effectively convey the substance of their  
25 work to others skilled in the art. A procedure, computer executed step, logic block,  
26 process, etc., is here, and generally, conceived to be a self-consistent sequence  
27 of steps or instructions leading to a desired result. The steps are those requiring  
28 physical manipulations of physical quantities.

29           Usually, though not necessarily, these quantities take the form of electrical

1 or magnetic signals capable of being stored, transferred, combined, compared, and  
2 otherwise manipulated in a computer system. It has proven convenient at times,  
3 principally for reasons of common usage, to refer to these signals as bits, values,  
4 elements, symbols, characters, terms, numbers, or the like.

5 It should be born in mind, however, that all of these and similar terms are to  
6 be associated with the appropriate physical quantities and are merely convenient  
7 labels applied to these quantities. Unless specifically stated otherwise as apparent  
8 from the following discussions, it is appreciated that throughout the present  
9 invention, discussions utilizing terms such as "processing" or "computing" or  
10 "translating" or "selecting" or "translating" or "displaying" or "recognizing" or the like,  
11 refer to the action and processes of a computer system, or similar electronic  
12 computing device, that manipulates and transforms data represented as physical  
13 (electronic) quantities within the computer system's registers and memories into  
14 other data similarly represented as physical quantities within the computer system  
15 memories or registers or other such information storage, transmission or display  
16 devices.

## 17 18 **TIME ZONE MANAGEMENT IN ACCORDANCE WITH THE INVENTION**

19 While this invention is susceptible of embodiment in many different forms,  
20 there is shown in the drawings and will herein be described in detail specific  
21 embodiments, with the understanding that the present disclosure is to be  
22 considered as an example of the principles of the invention and not intended to limit  
23 the invention to the specific embodiments shown and described. In the description  
24 below, like reference numerals are used to describe the same, similar or  
25 corresponding parts in the several views of the drawings.

26 Turning now to **FIGURE 1**, an exemplary date-book display 20 showing a  
27 daily view (contrasted to a weekly or monthly view) for a selected date such as that  
28 which appears in version 3.0 the Palm Operating System by Palm Computing, Inc,  
29 Santa Clara, California. The date is shown in block 24 and the day of the week is

1 shown in block 28. The time blocks in the day are illustrated as a grid having an  
2 array of entries adjacent time blocks in a manner similar to that used in  
3 conventional paper date books. In one embodiment, such as that implemented in  
4 version 3.0 of the Palm Operating System from Palm Computing, Inc., the user  
5 enters dates directly into the date-book application by selecting a time (by tapping  
6 the space to the right of the time using a stylus on a touch sensitive touch-screen  
7 that serves as a display and input device) and entering a notation adjacent the time  
8 using a form of writing designed for handwriting recognition called the "Graffiti®"  
9 alphabet (Graffiti is a registered trademark of Palm Computing, Inc.). Text then  
10 appears adjacent the selected time. The time can be refined and other attributes  
11 added by selection of "details" button 34 (by tapping the button with the stylus).  
12 Thus, to enter an appointment or event starting at 6:00pm, the user taps the space  
13 38 adjacent the 6:00pm indication and then enters the event in a special area of the  
14 device designated for data entry.

15 **FIGURES 2-7** generally illustrate an exemplary user interface with various  
16 user interface elements including menus, windows, icons, buttons, data entry  
17 boxes, etc. that provide the user with the ability to enter data and make selections  
18 consistent with embodiments of the present invention. Those skilled in the art will  
19 appreciate that there are many ways to provide user interfaces and the exact user  
20 interface described herein should not be considered limiting to the scope of the  
21 invention, but should be considered as an illustrative example.

22 **FIGURE 2** illustrates an extension of the above event management  
23 mechanism to account for events occurring in various time zones. In this  
24 illustration, display 100 incorporates features similar to that of display 20 and in  
25 general, the palmtop computer implementing the present invention can carry out  
26 any or all of the function of the currently available palmtop computers, such as the  
27 Palm VII™ palmtop computer and others available from Palm Computing, Inc.  
28 Display 100 also includes an indicator 104 of the currently displayed time zone. Of  
29 course, those skilled in the art will appreciate that the current display time zone (the

1 time zone associated with the current date-book application display - referred to  
2 herein as the display time zone) can be indicated in other manners than that  
3 shown.

4 In one exemplary embodiment, in order to enter an appointment or event, the  
5 user taps the space adjacent the desired time and then enters the event in a  
6 special area of the device designated for data entry. In the example shown, an  
7 event 112 identified as "CONFERENCE CALL WITH YOSHIDA" has been entered  
8 and stored in association with a time block starting at 6:00pm and ending at  
9 7:00pm. This event is still selected as indicated by the shading of the "6:00" time  
10 indicator 116. In order to alter the time zone or make other entries associated with  
11 the date and time, the user can select the "details" button 120 (by tapping the  
12 button with a stylus) to bring up an "EVENT DETAILS" menu 130. This menu can  
13 be used in a conventional manner to add notes, alarms or other attributes to the  
14 event. In accordance with one embodiment of the present invention, this menu can  
15 also be used to change the time zone associated with the event (the event time  
16 zone). The user can select a default time zone as a device preference to prevent  
17 the need to enter an event time zone unless it deviates from the default time zone.  
18 This default time zone appears in block 136 and will be associated with an event  
19 unless specifically changed by the user.

20 In order to change the time zone associated with the currently selected  
21 event, the user selects the "TIME ZONE" block 136 in the EVENT DETAILS menu  
22 (again, by tapping the block with a stylus) to bring up a list of time zones in a  
23 "SELECT TIME ZONE" menu 210 as illustrated in display 200 of **FIGURE 3**. The  
24 user can then select a time zone to be associated with the event. In this illustrative  
25 example, the Tokyo time zone is selected as indicated by shading of box 220. In  
26 one embodiment, selection of that event time zone will then cause the selected  
27 time zone to be temporarily reflected in the time zone display 104, but this is not  
28 to be limiting, since the display time zone is managed in a separate manner as will  
29 become apparent later. The list of time zones in menu 210 may be a default list  
30 containing all possible world time zones in one embodiment. In another

embodiment, the menu may contain only the most recently used time zones. In yet another embodiment, the user can select an array of time zones to be displayed during a setup procedure. Other variations are also possible within the scope of the present invention.

Once a time zone has been associated with the event as described above or using any suitable alternative for making such an association, it is saved as an attribute associated with the event. The user can display appointments and other events in any display time zone and the appointment (event) times are translated from the stored event time zone to the display time zone. This is illustrated in display 400 of **FIGURE 4**, wherein the display time zone is the default time zone, which in this illustrative example is Central European Time as shown in area 104. Displayed in Central European Time, the event 112 is shifted in time by eight hours to 10:00am as shown 410 so that the event can be readily understood and coordinated with other events in the local time.

If the user wishes to change to another display time zone, the user can select the time zone button 420 to bring up a "CURRENT TIME ZONE" menu 515. The user can then adjust the display time zone as desired. In this example, the current time zone (the display time zone) can be changed to Tokyo time by selecting the TOKYO block 525 from menu 515. This causes the display 500 to indicate Tokyo time at 104 and shift the event 112 to 6:00pm as illustrated in display 600 of **FIGURE 6**. Those skilled in the art will appreciate that other events might also be scheduled in a particular day and those events would similarly shift with selection of a new time zone. In generally, the user can select a default time zone to prevent the need to enter either a display or an event time zone unless it deviates from the default time zone.

Time zones are commonly associated with a number of hours difference (plus or minus) from Greenwich Mean Time (GMT). Thus, in order to translate between two time zones, the difference between the two time zones and GMT can simply be subtracted. For example, Tokyo time is GMT+ 9 hours while Eastern

1 U.S. Standard Time is GMT -5 hours. Thus, to translate a time between these two  
2 time zones, one simply subtracts so the difference is 14 hours. In many cases, the  
3 date might also require correction in any time zone translation and should be  
4 reflected in block 24.

5 In the event the current palmtop computer is able to receive indications of  
6 a time zone change (e.g., from a wireless service provider, a network or other  
7 communication), the display time zone may be updated semi-automatically in  
8 accordance with an embodiment of the present invention illustrated in connection  
9 with display 700 of **FIGURE 7**. In this case, the palmtop computer receives an  
10 indication that a time zone change has occurred and the user is prompted by a  
11 simple window 712 appearing on the display that the time zone may have changed.  
12 When it is detected that a time zone may have changed, the system tries to  
13 determine the new local time zone and display it as a part of the alert. In this  
14 illustrative example, the window 712 indicates that the new time zone may be  
15 Eastern U.S. as indicated by box 718. The user is offered the opportunity to accept  
16 the new time zone as the display time zone. The user can then either accept the  
17 offer by selecting button 724 or reject it by selecting button 730. If the displayed  
18 time zone is incorrect, the user can simply tap the displayed time zone in box 718  
19 to make a selection of a correct local time zone. This permits the user to display  
20 any selected display time zone, even if it is one outside the time zone that the user  
21 is currently in.

22 The current invention may be implemented as a computer program running  
23 on a palmtop computer or other computer system. One exemplary palmtop  
24 computer system is illustrated in **FIGURE 8**. **FIGURE 8** illustrates circuitry of  
25 computer system 800 which includes an address/data bus 810 for communicating  
26 information, a central processor 812 coupled with the bus for processing  
27 information and instructions, a volatile memory 820 (e.g., random access memory  
28 RAM) coupled with the bus 810 for storing information and instructions for the  
29 central processor 812, and a non-volatile memory 830 (e.g., read only memory

1 ROM) coupled with the bus 810 for storing static information and instructions for  
2 the processor 812. Computer system 800 also includes an optional data storage  
3 device 836 (e.g., memory stick, SD memory, etc.) coupled with the bus 810 for  
4 storing information and instructions. Device 836 can be removable. As described  
5 above, system 800 also contains a display device 840 coupled to the bus 810 for  
6 displaying information to the computer user.

7 Also included in exemplary computer system 800 is an alphanumeric input  
8 device 850 which in one implementation is a handwriting recognition pad  
9 ("digitizer") having regions forming part of a touch sensitive display for data entry.  
10 Device 800 can communicate information and command selections to the central  
11 processor 812. System 800 also includes an optional cursor control or directing  
12 device 856 coupled to the bus for communicating user input information and  
13 command selections to the central processor 812. In one implementation, device  
14 856 is a touch screen device incorporated with the display. Device 856 is capable  
15 of registering a position on the display screen where the stylus makes contact. The  
16 display device utilized with the computer system 800 may be a liquid crystal device,  
17 cathode ray tube (CRT), field emission device (FED, also called flat panel CRT) or  
18 other display device suitable for creating graphic images and alphanumeric  
19 characters recognizable to the user. In one embodiment, the display is a flat panel  
20 display.

21 Signal communication device 860, also coupled to bus 810, can be a serial  
22 port for communicating with the palmtop computer's cradle. Device 860 can also  
23 include an infrared communication port and an interface to a radio frequency  
24 transmitter/receiver (transceiver) 870 to permit wireless communication using  
25 antenna 880.

26 The various operations described heretofore can be implemented as  
27 computer controlled processes stored as program instructions that are carried out  
28 on programmed central processor 812. The operations described above can be  
29 broadly described by the processes shown in **FIGURES 9-11** below.

1 With reference to **FIGURE 9**, an exemplary process for a user associating  
2 a time zone with an event is broadly depicted as process 900 starting at 910. At  
3 920, the user enters an event in the appropriate location on the time grid and then  
4 selects a time zone at 930. In one embodiment, this is done by selecting a details  
5 button to call up a time zone selection, and then selecting the time zone from a  
6 time zone menu. Once the time zone is selected, it is associated with the entry  
7 and the event is displayed in the currently selected display time zone at 940. The  
8 process ends at 950.

9 With reference to **FIGURE 10**, an exemplary process for a user changing the  
10 display time zone is broadly depicted as process 1000 starting at 1010. At 1020,  
11 the user selects a time zone for the display time zone. This may be accomplished  
12 by selecting a time zone button from the user interface to produce a time zone  
13 menu or using any other suitable user interface mechanism. At 1030, all events  
14 to be displayed are translated to the display time zone. At 1040, the translated  
15 events are displayed in the current time zone. The process ends at 1050.

16 With reference to **FIGURE 11**, an exemplary process for semi-automatically  
17 changing a display time zone is depicted as process 1100 starting at 1110. At  
18 1120 if no time zone information has been received, the process waits. If time zone  
19 information is received at 1120 and the time zone is new (i.e., different from the  
20 current time zone) at 1125, the user is prompted to confirm a change to a new time  
21 zone at 1130. If the time zone is not new at 1125, no action is taken and the  
22 process returns to 1120 to await the next time zone information. If the user  
23 chooses not to confirm the change at 1130, control again returns to 1120. If the  
24 user confirms the change, the display time zone is changed at 1150 and then  
25 control returns to 1120. Many variations of this process are possible including  
26 omitting the confirmation by the user in the event the time zone information is  
27 considered reliable. However, it is preferable that there be a confirmation process  
28 since this permits the user to select any desired time zone for any desired purpose.

1 Elements of the various user interfaces not explicitly discussed herein  
2 operate in a manner similar to that of conventional elements as used in the Palm  
3 Operating System version 3.0.

4 With the invention described, the exemplary situations discussed previously  
5 are readily handled as follows:

6 1. You are in France and schedule an appointment for a phone call with  
7 someone in California. You both want to deal with the same time and time zone  
8 to create the appointment, but still see at what time this will translate in your own  
9 local time zone. In this case you simply decide on the common time zone and both  
10 parties use this time zone for the event and display time zones.

11 2. You are in France and schedule an appointment for a phone call with  
12 someone in California while you will be in Tokyo. You want to use the California  
13 time to set the appointment, and see it displayed in your local time, even if you  
14 have changed time zone since you set it. In this case you simply set the  
15 appointment using California time as the event time and set the display time for the  
16 current time zone you are in.

17 3. You are in France, and schedule a meeting with someone in California, but  
18 this meeting will take place in Tokyo. You both want to be able to use Tokyo time.  
19 In this case, both parties can simply use Tokyo time for the event time. The time  
20 can be displayed using the display time as Tokyo time.

21 Many other scenarios present themselves and can be handled in a similar  
22 manner.

23 Those skilled in the art will recognize that the present invention has been  
24 described in terms of exemplary embodiments based upon use of a programmed  
25 processor. However, the invention should not be so limited, since the present  
26 invention could be implemented using hardware component equivalents such as  
27 special purpose hardware and/or dedicated processors which are equivalents to  
28 the invention as described and claimed. Similarly, general purpose computers,  
29 microprocessor based computers, micro-controllers, optical computers, analog

1 computers, dedicated processors and/or dedicated hard wired logic may be used  
2 to construct alternative equivalent embodiments of the present invention.

3 Those skilled in the art will appreciate that the program steps and associated  
4 data used to implement the embodiments described above can be implemented  
5 using disc storage as well as other forms of storage such as for example Read  
6 Only Memory (ROM) devices, Random Access Memory (RAM) devices; optical  
7 storage elements, magnetic storage elements, magneto-optical storage elements,  
8 flash memory, core memory and/or other equivalent storage technologies without  
9 departing from the present invention. Such alternative storage devices should be  
10 considered equivalents.

11 The present invention, as described in embodiments herein, is implemented  
12 using a programmed processor executing programming instructions that are  
13 broadly described above in flow chart form that can be stored on any suitable  
14 electronic storage medium or transmitted over any suitable electronic  
15 communication medium. However, those skilled in the art will appreciate that the  
16 processes described above can be implemented in any number of variations and  
17 in many suitable programming languages without departing from the present  
18 invention. For example, the order of certain operations carried out can often be  
19 varied, additional operations can be added or operations can be deleted without  
20 departing from the invention. Error trapping can be added and/or enhanced and  
21 variations can be made in user interface and information presentation without  
22 departing from the present invention. Such variations are contemplated and  
23 considered equivalent.

24 While the invention has been described in conjunction with specific  
25 embodiments, it is evident that many alternatives, modifications, permutations and  
26 variations will become apparent to those skilled in the art in light of the foregoing  
27 description. Accordingly, it is intended that the present invention embrace all such  
28 alternatives, modifications and variations as fall within the scope of the appended  
29 claims.

30 What is claimed is: